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CROSS-PLATFORM SERVING OF WIRELESS CONTENT

This invention relates generally to wireless communication systems, and more specifically deals with a method and apparatus for the customized display of content by a browser of a wireless device.

Background of the invention:

With the pervasive presence and constantly increased use of the Internet and similar client-server computer technologies in society today, one of the limitations to the even further expanded use of such technologies and content delivery services is the availability of access. Initially and traditionally Internet access was only available by the use of a computer hard-wired by a modem or the like to the public telephone system. The advent of laptop computers and such systems as cellular or CDPD modems has made Internet access more portable, but users are still limited with a laptop computer by the bulk of the device. It is not really practical to carry and use a laptop computer for such simple functions and as such the access to the information available is not as ready

as it could be. For example if a laptop computer is the method of roaming Internet access for a user they might only assemble or start their computer a couple of times per day due to the time involved.

Wireless access devices are becoming more popular, particularly for 'thin' applications such as basic information retrieval or e-commerce applications. The wireless devices are generally speaking smaller in size such as a cell phone, personal digital assistant or other handheld device. The smaller size and capabilities of these devices results in a somewhat more limited feature set for the user, but the limited feature set is often a welcome trade-off to a mobile individual who simply wants a wireless device from which they could, for example, check their email or place financial orders or stock trades, which are two very popular applications for these wireless devices. Contrary to the laptop computer roaming method, these devices are small enough and quickly enough started that an individual can, for example, check their email as many times as they wish or even have an 'always-on' notification when a new email arrives at their devices. In many cases people would actually carry both a wireless device and a laptop computer, and use the computer for more involved work

while using the wireless device for the more basic functions at which it excels.

In both the case of the laptop computer and the wireless device, access to Internet-based services, content and applications is generally by way of a 'browser' program installed on the device. The browser, which is operatively connected to the Internet by way of other software and hardware components in the device in which it resides, uses an addressing system to contact a server on the Internet on which the desired information resides and make a request for such information. The server then transmits back to the browser a file which contains the information and which the browser can interpret and display to the user. The browser that is used on a PC is generally referred to as an "HTML browser", since it receives information from the server in HTML ("Hyper-text Markup Language") and is programmed to interpret HTML files for display to and interaction with the user. An example of an HTML browser might be Microsoft's Internet Explorer™ or any one of a number of competing products.

Wireless devices also use a browser to interact with their users and servers to which they are operatively connected by way of the wireless communications system of

which they are a part. In the case of wireless devices, Wireless Application Protocol (WAP) is a standard communications protocol used by such wireless systems and WML ("Wireless Markup Language") is a standardized language for use in communication between a wireless browser and a server operatively connected thereto by way of the wireless subscriber system - the browsers in wireless devices are WAP browser communicating with WMLs, versus the HTML browsers of traditional computers.

Despite the standardization, to a certain extent, of communications with wireless devices by way of WAP protocols and WAP browser communicating with WMLs, one of the problems with widespread deployment of wireless-enabled Internet applications is the difference in capabilities between various WAP browser communicating with WMLs installed in such wireless devices. For example, some of the most obvious variable parameters between wireless devices are display size and other similar device functionality limitations. If one personal digital assistant such as a pager is equipped with a WAP browser communicating with WML which can only display one line of text and another device such as a Palm™ organizer can display several lines of text both because of its display size and being equipped with a WAP

browser communicating with WML capable of displaying same, it is necessary to accommodate both types of display formats in the preparation of WML content for display on these types of devices unless the 'least common denominator' is to be chosen and only content for the most basic browser served regardless of the configuration or functionality of other browsers. This problem is further exacerbated by the proliferation of different wireless devices with different capabilities, each of which might have a different WAP browser communicating with WML installed therein.

The problem that it is intended to address in the present invention is the requirement for customized content for various wireless devices on a subscriber system based on the capabilities of the wireless devices of individual subscribers while keeping system communications overhead as low as possible. In the past one method of doing this has been for a customer to specify to their wireless provider the type of device and WAP browser communicating with WML which they have when setting up their subscriber accounts, and then when the server of the wireless system receives an information request from a particular subscriber device, the subscriber records are consulted for the particular type of device/browser and the

appropriate version of the requested content is then sent to the requesting device. The limitations of this rudimentary approach, however, include the constant maintenance overhead requirements. Not only is it necessary to program the particulars of subscriber devices into the system in advance of allowing content access, the system then also needs to be reprogrammed if a subscriber switches devices. This type of a system is also limited insofar as providers operating on this type of a system are basically forced to support only a limited number of types of devices, since they need to store specific versions of each piece of content on their system for each type of device/browser supported. Not only are storage requirements increased exponentially each time a new browser is supported, but these various versions of each piece of content also need to be generated and catalogued properly at some point so that they can be accessed by the server at a later time for serving to their appropriate subscriber devices. For example, a particular wireless provider may choose to support only two or three types of devices in an attempt to reduce the administrative and system overhead associated with operating this type of a system, but the attendant restriction on the types of devices which customers are allowed to buy and activate on the system

limits consumer choice as well as potentially limiting equipment sales revenue.

Other methods have included basically converting HTML formatted documents for display in a WAP browser communicating with WML, which results usually in imperfect conversions and can present problems in the viewing of any such improperly converted documents in a WAP browser communicating with WML. As well the system processor overhead for running such conversions is high and as such the system hardware requirements are high.

There are many practical interactive business applications for use on the Internet which users of both wired computers and wireless devices can benefit from. Examples listed above, which are in no way exhaustive of even the scope of the field, are information display or content services, email or contact management services, and other e-commerce services such as stock-trading or financial applications or other services where consumers can access content or information on a server operated by a vendor and can optionally place purchase orders for products or services therefrom. Convergence of wired and wireless Internet technologies has led to a demand for client-server Internet applications that are compatible

across both the established WWW/HTML and wireless platforms. With the rapid growth of hardware and software combinations available in the wireless space, it is necessary to provide a more flexible content serving system which will accommodate all various types of browser/device combinations without the excessive system and administrative overhead involved to date.

Summary of the invention:

It is the object of the present invention to provide a system and method for a wireless communications system which would allow for the display of content by a browser in a wireless device in a format optimized for that particular type of browser, while the content displayed is drawn from a central database. The wireless communication system of the present invention would include a server which contains a raw content database and a plurality of browser optimization templates. Each browser optimization template is capable of optimizing content drawn from the raw content database for display on a particular type of browser of a wireless device upon application thereto. The method of display of the present invention includes the steps of sending a content

request from a requesting browser of a wireless device to the server, wherein the content request would include content selection criteria and a browser identifier identifying the type of the requesting browser. In the server, a query would be executed in the raw content database to identify the raw content therefrom which satisfies the content selection criteria, and then the results of that query are the requested content. The browser optimization template corresponding to the type of the requesting browser would be selected from those stored within the server, as identified by the browser identifier contained within the content request. The selected browser optimization template would then be applied to the requested content to generate a version of the requested content which is optimized for display and use in the requesting browser. This optimized version of the requested content would then be transmitted back to the requesting browser for display to or use by the user of the wireless device.

This method might also optionally include the step of providing a central template server operatively connected to the server of the wireless communications system wherein the browser optimization templates which are used by the server of the wireless communications system in

optimizing requested content are stored in a central template server rather than on the wireless server and are accessed therefrom as needed. Alternatively, the central template server might be operatively connected to the server of the wireless communication system and the browser optimization templates stored in the wireless communication system server could be download from the central template server from time to time. Periodical updates of the browser optimization templates stored in the server of the wireless communication system of the present invention could be scheduled and this would result in the ability to add new templates for new browser types to a central location and all wireless communication systems of the present invention could then download the templates from the template server.

Where a browser identifier in a content request does not correspond to a particular browser optimization template stored in the server, ie. where a new browser type is used, a default browser optimization template might be specified for application to the requested content where an unidentified browser is used. This might be a basic embodiment or basis content template which would provide only basic output and basis functionality, but would provide applicability or functionality across a broad

base of different browser types. If an unknown browser type was encountered, a new template could then be requested or prepared for that browser type for use in the future.

Where a new browser type was encountered by the system of the present invention, the system might request the requesting browser to transmit further operating parameters thereof to the server for use in the subsequent programming of the browser optimization template customized for that particular browser type. The generation of new browser optimization templates for new browser types could either be automated or, alternatively, the parameters and necessary information could be recorded in the system of the present invention for later action by an operator of the system to program necessary browser optimization template changes.

Various formatting changes could be undertaken by the browser optimization templates to yield optimized content for display in a particular type of a requesting browser. For example, the application of a selected browser optimizing template to a requested content data set might result in the pagination of the requested content, where the particular browser type would not accommodate a data

set of the size requested. The pagination of the requested content data set might result in one or more pages of optimized requested content. Where more than one page was yielded by the optimization of the requested content, the application of the selected browser optimization template might also include the addition of navigational controls or software components to the pages thereof which would operate properly in the requesting browser, to allow for navigation of the requested content by the user of the wireless device at their requesting browser. Similarly, in addition to adding navigational controls to requested content, the application of a selected browser optimization template might also include the selection of other software controls operable in the particular requesting browser to said content. For example, where software or hardware functionality of a particular wireless device was more extensive than others, it might be possible in that particular browser optimization template to enable additional functions within the content requested. It might also include the activation, reprogramming or customization of controls on the wireless device which are under the control or configuration scope of the requesting browser.

The application of a selected browser optimization template to requested content might also result in the prioritization of requested content based on prioritization parameters contained within the selected browser optimization template. This would be of particular importance where it was going to be necessary to paginate content requested where, for example, the most important content would be put on the first page of the optimized content and other content could be stratified below on other pages, yielding an "deck of cards" data structure with or without specific navigational controls of a software embedded therein. The navigational controls might simply be hyperlinks between the cards in the deck or alternatively might be some other type of custom support and control.

A browser optimization template might also select the program to include a formatting step which results in the addition of other static content stored within the selected browser optimization template to the requested content.

The best method of generating good WML content for viewing in a wireless browser is to generate that content fresh from a database, and to generate that content

specifically for the browser in question rather than trying to run any significant number of conversions on an otherwise prepared file since each conversion can result in a degradation of the final data file and its integrity, and requires too much processor overhead to make rapid serving of such content practical.

There is also disclosed a wireless communication system capable of optimizing content for display in the browsers of various wireless devices connected to said system wherein the system comprises a raw content database containing raw content to be served to wireless devices upon request therefore, a plurality of browser optimization templates, wherein each said browser employs a template corresponding to a particular type of browser found in a wireless device and contains optimization rules for application of the selected raw content from the database to optimize that raw content for display in that particular type of a browser, as well as a series of software and hardware components. There would be a data transfer system capable of receiving content requests from browsers of requesting wireless devices, being requesting browsers, and transmitting optimized requested content to the requesting browsers which are requesting same. Each content request which would be transmitted

from a requesting browser would include selection criteria identifying the content from the database which was required by the user of the wireless device, as well as a browser identifier identifying the type of the requesting browser which could be used to identify the proper optimization template for application to the requested content.

A content optimization system would also be included which would, upon receipt of a content request from the data transfer system, select raw content from the raw content database which corresponded to the content selection criteria included in the content request, which selected content would be requested content, and would then go on to select a browser optimization template corresponding to the browser identifier of the content request and optimize the requested content for display in the requesting browser by applying the selected browser optimization template thereto. The optimized requested content would then be transmitted back to the requesting browser via the data transfer system.

The system might also comprise a central template server operatively connected to the system wherein the browser optimization templates would be stored in the central

template server rather than the server of the wireless communication system and accessed therefrom as required. An alternative is access and storage of the browser optimization templates on the central template server would be to provide a central template server operatively connected to the system wherein the browser optimization templates which are stored in the communication system are downloaded from the central template server from time to time. Periodic updates could take place to ensure that the most up-to-date set of browser optimization templates were in place in all wireless communications systems operatively connected to the same central template server. Again, as outlined above with respect to the method, the content optimization system of the present invention could specify a default browser optimization template for use where a browser identifier which was not recognized or did not correspond to a browser optimization template stored within the system of the present invention was encountered. In such a case, further information regarding the requesting browser might be requested from the requesting browser by the server for the automated or manual generation of a specific browser optimization template corresponding to that previously unknown browser identifier for future use.

A template generator might be included in the system of the present invention that could automatically or semi-automatically create new browser optimization templates for previously unknown browser identifiers.

Description of the drawings:

These and other features and advantages of the invention will now be described with reference to the drawings of certain preferred embodiments, which are intended to illustrate and not limit the invention, and in which:

Figure 1 is

Figure 2 is

Figure 3 is

Detailed description of the illustrated embodiments:

To facilitate a complete understanding of the invention, the description of the preferred embodiments is arranged within the following sections:

Glossary of terms and acronyms
Overview of system components and operation
Data transfer system
Raw content database
Browser optimization templates
Content optimization system
Central template server
Template generator

Glossary of terms and acronyms:

The following terms and acronyms are used throughout the detailed description:

Client-Server. A model of interaction in a distributed system in which a program at one site sends a request to a program at another site and waits for a response. The requesting program is called the "client," and the program that responds to the request is called the "server." In the context of the World Wide Web (discussed

below), the client is a "browser" which runs on a computer or wireless device of a user; the program that responds to browser requests by serving Web pages is commonly referred to as a "server."

Internet. A collection of interconnected (public and/or private) networks that are linked together by a set of standard protocols (such as TCP/IP, WAP and HTTP) to form a global, distributed network. (While this term is intended to refer to what is now commonly known as the Internet, it is also intended to encompass variations which may be made in the future, including changes and additions to existing standard protocols.) Currently, the primary standard protocol for allowing wireless applications to locate and acquire Web documents is WAP, and the Web pages are encoded using WML. However, the present invention is intended to encompass future markup languages and transport protocols which may be used in place of (or in addition to) WAP, WML, HTML and HTTP.

WAP (Wireless Application Protocol). The standard client-server protocol used for the exchange of information (such as WML documents, and client requests for such documents) between a wireless browser and a server. WAP includes a number of different types of messages which

can be sent from the client to the server to request different types of server actions.

WML (Wireless Mark-up Language). A standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents for display in a WML/WAP browser on a wireless device. During a document authoring stage, the WML codes are embedded within the informational content of the document and when the WML document is subsequently transferred from a server to a WAP browser communicating with WML, the codes are interpreted by the browser and used to parse and display the document. In addition to specifying how the browser is to display a document, WML tags can also be used to create links to other documents and accomplish other actions. Use of WML to communicate with WAP browsers results in the ability to simultaneously develop Web-based applications that can be viewed both in the traditional Web browser and in a handheld device because WML is a subset of XML (Extensible Mark-up Language), which is a mark up language is which is also readable on a standard browser.

Wireless Device. A wireless device is any portable subscriber unit which is capable of communicating within

the system of the present invention and would particularly include such things as wireless data messaging units and the like, each of which has a user display by way of which a user can view and interact with information within the wireless device and also has software installed therein which includes a browser. In the case of wireless devices of this day and age, the browser would be a WAP browser communicating with WML. It will be appreciated that other similar equipment and further software components could be utilized as well for the wireless device and all such changes are contemplated within the scope of the present invention.

Overview of system components and operation:

There is shown an example of a wireless communication system in accordance with the present invention. The wireless communication system includes an infrastructure portion. The infrastructure portion of the system would include the necessary hardware to enable communications between wireless devices in the system. In many cases this will include a controller and a plurality of base stations by which a plurality of wireless devices can then communicate with the system. The base stations or

infrastructure section of the system would preferably communicate with the wireless devices utilizing a conventional radio frequency (RF) techniques, and would be coupled by conventional communication links to the controller and, in turn, the base stations of the infrastructure section of the system. The infrastructure section of the system might, as a combination of hardware and/or software components, comprise the data transfer system of the present invention, discussed in further detail below.

A base station of the system of the present invention would transmit RF signals to a wireless device via an antenna. The base station of the infrastructure section of the system would preferably also receive RF signals from the plurality of wireless devices via the antenna. The RF signals transmitted by the station to the wireless devices (data messages) comprise requested data requested by the browser within a wireless device along with select call addresses identifying the wireless device to which the data message is directed, as well as any other function of the above system for adjusting the operating parameters of the radio communications system. The contents of the data message to a wireless device of the present invention also include a preformatted optimized

requested content data set corresponding to a content request which was sent by a wireless device by way of its browser to the system. The RF signals transmitted by the wireless devices to the system would include content requests which specify selection criteria for content which are requested from the database by the user of the wireless device, as well as a browser identifier contained in such content requests which identifies the type of browser present or installed within the wireless device in question.

The system of the present invention is operatively connected to a server, by way of the Internet or communications links, which actually performs the extraction of selected content from the database in correspondence to a content request as well as the optimization of that extracted content for display on the particular type of browser installed within a wireless device.

The wireless devices of the system of the present invention would be any wireless device, as in the conventional description or understanding of that term, that can communicate with the system of the present invention. Generally speaking, a wireless device

contains an antenna for intercepting an outbound message from the system as well as for transmitting an inbound message to the system, which in the particular case of the present invention the inbound message would include the details of content requests from the browser within the device. The antenna of the wireless device is coupled to a conventional receiver for receiving an outbound message and transmitting an inbound message as well as being coupled to a processing system which processes messages received and generated by the device while controlling the wireless device in accordance with the present invention. As outlined below, a user interface is also coupled to the processing system of the wireless device for interfacing with the user and the user interface device might comprise a conventional display for displaying information, an alert element or a data input or data entry terminal.

Within the memory of the wireless device would be a browser which would actually interact with the user of the device by way of the user interface. The browser which in most cases would be a WAP browser communicating with WML, is at the heart of the present invention insofar as the browser installed in a particular wireless device will be a browser that is capable of using the

functionality of a particular wireless device to display and interact with the user. Different browsers installed in different wireless devices will have different capabilities depending on the capability of the wireless device itself. For example, certain browsers might have larger display areas or more in-depth functionality depending on the software and hardware capabilities of the wireless device.

It will be understood that the other particulars of wireless devices communicating in such a wireless communications system as that demonstrated in the present invention are well known to those skilled in the art and, as such, any further modifications thereon or general requirements are understood to be contemplated within the scope of the present invention.

Also shown is an exemplary server in accordance with the present invention. The server includes a data transfer system or a conventional communication interface for communicating with the wireless devices through the Internet and/or the remainder of the infrastructure portion of the wireless communication system of the present invention. The communication interface or data transfer system is coupled to other software components

within the server for controlling and communicating with the data transfer system.

Generally speaking, the server would comprise a conventional computer and memory, as will be understood by one skilled in the art. Stored within the server is a raw content database which is any data structure which contains content that can be requested by browsers of wireless devices, and which content will be formatted or optimized for display by the particular type of the browsers requesting such content in advance of transmission of such content to the browser from the server and the system.

Also included within the software components or other components of the server, in addition to the data transfer system and the raw content database, are a plurality of browser optimization templates. The browser optimization templates are designed to, upon application thereof to a data set of requested content from the database, optimize that dataset for display by the particular browser of the wireless device requesting such content. As will be outlined in further detail below, the browser optimization template could perform any number or type of formatting operations on a

requested content data set and all such formatting or optimization operations or contemplated within the scope of the present invention.

Requesting browser/device:

The wireless devices of various users of the system could be any wireless devices operatively connected to the system which had a user display through which the user of the device could interact with the device. Software components of the wireless device would include a browser. The browser is referred to herein as the 'requesting browser' where referring to a specific user's browser from which a content request is being made to the system of the present invention.

The flexibility and advantage of the present invention is that many different types of devices and browsers are accommodated by the system, and each browser can have a customized or optimized dataset served to it upon the lodging of a content request with the server.

The wireless device needs to be able to send a content request to the server. This might be done by selecting a

link in the browser or by sending the content request in some other fashion to the server.

When a content request is sent to the server from a wireless device by way of the requesting browser installed therein, the content request will indicate the content that is requested, as well as including a browser identifier. The browser identifier would be transparently transmitted to the server from the browser 8 along with the substance of the content request, and is used by the system and the server to apply the proper browser optimization to the selected content before returning same to the browser for viewing.

The content requested by a content request would be stipulated by way of content selection criteria contained in the content request. The content selection criteria might actually be query values to be executed against the content database, or alternatively and most likely would consist of a hyperlink value which would then be equated to some particular type of a query or extraction action to be carried out upon the database which queries or actions are stored in the server along with the remainder of the software and data components. For example, if a page is displayed in a browser that gives three hyperlink

options to the user, each of which hyperlinks is linked to another page for serving to the browser upon selection of that hyperlink, the selection criteria contained in the content request might simply be an indicator of which hyperlink was selected, which hyperlink might then in turn link directly to another record in the content database, or might alternatively link to a record in the database which engages further queries or actions to return additional data to the browser or take other action.

Data transfer system:

The data transfer system is one component of the computer program contained in the server. The data transfer system might also include some combination of software and hardware components. It will be understood that any type of a combination of software and hardware components which accomplishes the objective of enabling communication between the server of the system and the requesting browsers of wireless devices on the system, are contemplated within the scope of the present invention.

The data transfer system would be responsible for receiving the details of a content request transmitted from a requesting browser. The data transfer system as such might then be a software component in the server which is responsible for receiving content request information from devices as it is received by the server of the system.

In addition to receiving the details of content requests from the requesting browsers, the data transfer system would also be responsible for transmitting the optimized requested content back to the requesting browser upon completion of processing thereof by the content optimization system.

As outlined above, the data transfer system might be any combination of software and/or hardware components which enables communication between wireless devices and the server of the present system. It will be understood that all such combinations as will be obvious to one skilled in the art are contemplated within the scope of the present invention.

It will also be understood that the data transfer system might either be its own separate software component or

might alternatively be a part of another software component of the computer program within the server. For example, the data transfer system might be a sub-component of the content optimization system. In any event, any software or combination of software and hardware which enables the two-way communication of wireless devices with the system insofar as content requests can be transmitted from the requesting browser of a wireless device to the server of the system, and an optimized requested content data set can be transmitted back from the content optimization system by way of the data transfer system to the requesting browser is contemplated within the scope of the present invention.

Raw content database:

The server of the wireless system of the present invention includes a computer program that, through various software components, would carry out the administration and operation of the system of the present invention. One element of the computer program could be a content database maintenance component which would be responsible for the maintenance of the records or data stored within the raw content database. The raw content

database 4 would be stored in the memory of the server and the content database maintenance component could be any software component capable of accessing and administering this database and communicating with other software components within the system.

It will be understood that the database structure of the raw content database could be any type of a data structure that could be administered by a software component within the server and that all such types of data structures are contemplated within the scope of the present invention.

This invention relates generally to wireless communication systems, and more specifically deals with a method and apparatus for the customized display of content by a browser of a wireless device.

Background can displayed when called, or might actually include specific applets or software controls which could be served to a wireless device upon receipt of a call for same. The raw content might also include images or other multimedia data, or any type of information or software code which it was desired to serve to the browser of a wireless device in the course of an application. For

example, the raw content might even include menus or options which in turn hyperlinked or pointed to additional raw content within the database and as such a request for this type of content might result in the preparation, optimization and display to the user of a requesting browser of a multi-tiered dataset. It will be understood that any type of data or software components which can be served to the browser of a wireless device could be stored in the raw content database with the necessary or attendant accommodations being made in the database structure, and all are contemplated within the scope of the present invention.

The raw content database maintenance component might be a part of the content optimization system or might be a separate software component. It will be understood that any type of a software design accomplishing the goals or objectives outlined herein is contemplated within the scope of the present invention.

Where it was a part of the content optimization software component or was a separate component, the content database maintenance component might be involved in the preparation or extraction of raw content from the database corresponding to content selection criteria

contained within a content request received from a requesting browser. The database maintenance component 11 might execute a query against the database to select or return the raw content requested by the browser, or select the proper raw content in any other fashion as will be obvious to one skilled in the art. It will be understood again that all such selection methods are contemplated within the scope of the present invention.

Browser optimization templates:

The browser optimization templates are at the core of the present invention. Once the requested content is selected from the raw content database, a browser optimization template specifically set up for the type of the requesting browser is selected and used to customize or optimize the requested content for best display in the requesting browser.

The browser optimization template as it is applied to the raw content selected in accordance with the content selection criteria of the content request could carry out any number of different formatting operations on the

selected content to render it optimally viewable and navigable for the requesting browser.

It will also be understood that in addition to the types of formatting operations which could be programmed into and carried out by the application of the browser optimization templates, the types of formatting operations carried out for various requesting browsers on the same data could vary. For example, in certain cases if one requesting browser had high functionality and a large display, very little extra formatting might need to be carried out by the browser optimization template and the extent of formatting might consist of the application of a basic report format to the extracted data to present same for viewing in the requesting browser. In other circumstances, however, it might be necessary to carry out a number of formatting operations on the same requested content data from the database for display in a different, more restricted, requesting browser. For example, if the requesting browser had only a three-line display, the browser optimization template for that requesting browser might paginate that same data into numerous pages, and/or prioritize the data based on prioritization criteria associated with

Some of the actions which a browser optimization template might carry out would be to paginate the requested content to best match the display size of the requesting browser. Where more than one page resulted from this pagination, the application of the browser optimization template to these pages might also include the application or inclusion of software navigation controls or components in these pages to allow the user to easily browse them upon viewing the numerous pages in the requesting browser.

Beyond the inclusion of software controls for navigation purposes, a browser optimization template might also apply or insert other types of software controls into the requested content, based on the capabilities of the requesting browser. For example in a case where one type of a requesting browser had secure communication capabilities a financial web site might include e-commerce or purchase controls, or links to user financial information, in the requested content and allow the user to then browse further into that information, whereas if it knew that the browser with which it was communicating did not have secure communications capability, it might omit to include its e-commerce applets or components or the ability to view financial information from the

requested content served to such browser in favour of sending only generic or non-confidential information. It will be understood that the application or inclusion of any type of content or software controls in a requested content dataset served to a browser in the system of the present invention is contemplated within the scope of the present invention.

Another type of formatting which might take place based on the requesting browser type would be the simple omission of content from the requested content subset where the requesting browser was incapable of handling such content. For example a custom software component or control might be a part of a data subset returned upon preparation of a requested content subset from the content database, but if it is known that type of component is not functional in a browser of a particular type then the control could be omitted.

Another type of data optimization or formatting function which is contemplated is that certain content might be prioritized upon application of the browser optimization template where it was going to be necessary to paginate information requested by the browser. For example, where it was necessary to format a requested content dataset in

three pages, the most important information might be put on the first page or 'top card', with the remaining information stratified on the remaining cards or pages. The rules for such prioritization could be stored in the browser optimization template.

It will be seen from these demonstrative examples that virtually limitless customization of requested content is possible within this concept of browser optimization templates and it will be understood that all such data formatting or optimization measures as would be obvious to one skilled in the art based on the principles of the present invention are contemplated within the scope hereof.

The actual form of the browser optimization templates might be as a separate program to be run against a raw data file extracted from the raw content database, or might alternatively be one or more queries to be run against the requested content selected in response to a content request received by the system of the present invention from a wireless device. It will be understood that any type of software components capable of being executed by the content optimization system against a

selected subset of requested content are contemplated within the scope of the present invention.

While it is specifically contemplated that various browser optimization templates would be set up to format selected raw content for proper display in a WAP browser communicating with WML, it will also be understood that other browser optimization templates could be set up for various conventional HTML browsers, resulting in an even further flexibility of the system since then conventional HTML internet browsers could also access the same content within the raw content database as could wireless users, and all of the users would access the content in the same fashion which would mean that even the necessity of setting up a separately browsable set of content for use by HTML browsers is avoided. This type of functionality is particularly useful in applications where it is contemplated that users of both HTML and WAP browser communicating with WMLs will wish to access the application or content stored within the raw content database. It will be understood that this ability to use the system of the present invention in conjunction with HTML browsers, including the necessary communications or other changes attendant to enable same, are contemplated within the scope of the present invention as well.

Content optimization system:

The server of the wireless communication system of the present invention includes a computer program which has various software components which would carry out the actual selection and optimization of raw content from the database for transmission to a requesting browser. The content optimization system would be any combination of software components which would accomplish this objective.

As outlined above, the content optimization system would, upon receipt of a content request from a requesting browser by the server, either on its own or in conjunction with the content database administration component of the computer program in the server, select the raw content from the database which corresponded to the content selection criteria contained in the content request. The results of this query or retrieval of data from the database would then be optimized for display in the requesting browser by the application of one of the browser optimization templates stored within the system to that retrieved raw content data set.

The content optimization system would also identify the type of requesting browser from the content request corresponding to a particular raw data subset. The type of the requesting browser would be identified from the content request by way of the browser identifier which is included in the content request by the requesting browser. The content optimization system would then select the appropriate browser optimization template or templates from the collection of browser optimization templates stored within the server which will, upon application to the requested content data set, yield an optimized version of that data set for display in the particular type of requesting browser. It is foreseen that the browser optimization templates store in the server would include browser optimization templates for each different type of requesting browser available on wireless devices of any system of the present invention. As new browsers or wireless devices with browsers installed therein became available, new browser optimization templates could be created for those browsers and upon creation one time of the proper browser optimization template and storage thereof in the server, the system would be easily modified and equipped to

accommodate and handle data requests from new browser types.

As outlined above, the browser optimization templates would each be a separate program, query or the like which would reformat a selected raw content data set to an optimized version for display in a requesting browser upon application of such browser optimization template to a raw data subset. The content optimization system would work in conjunction with the other software components of the system to apply the selected browser optimization template to the selected data subset.

It will be understood that any combination of software and hardware components which accomplish the objective of selecting raw content from the database in accordance with selection criteria included in a content request, identifying the type of requesting browser from the browser identifier included in the content request, and applying the appropriate browser optimization template to the requested content data set yielded by the content selection criteria before transmitting same back to the requesting browser in a wireless device by way of the data transfer system of the present invention are contemplated within the scope hereof.

The content optimization system might have a default browser optimization template specified so that if a new type of browser sends a content request and the browser identifier contained therein does not correspond to any browser optimization template currently in the system, the default template could be applied. The default template could be a basic template which would allow for basic functionality and display across a broad cross-section of browsers. The default browser optimization template might also include a direction whereby further information is requested from the requesting browser, either as to its identification or its capabilities or functions, and this information recorded in the system such that a new browser optimization template could be prepared for that browser type.

It is contemplated that the method of communicating with wireless devices by the system would consist predominantly of WML as well as PHP4. PHP4 is a database programming language that allows for convenient database interfacing and supports the most popular database structures on the market. The intelligence of this programming language allows the device and platform to be independent while accessing and distributing information.

It is able to accomplish this task relatively quickly and efficiently. Also the code is open source allowing anybody to customize it as needed for specific applications. It will also be understood, however, that other database interface languages could also be used.

Central Template Server:

The system of the present invention might also include a central template server operatively connected to the server of the wireless communication system. The central template server might include a central template repository from which the browser optimization templates in the server might either be accessed or updated from time to time. It is foreseen that an embodiment of the system of the present invention including the central template server would provide the users of systems of the present invention with the easiest ability to keep the browser optimization templates in their system up to date. Numerous systems might be connected to the same central template server and the browser optimization templates in the server of the system could be updated or accessed thereon. This would allow for the creation in one location or place of new browser optimization

templates for new browser types, or reprogramming or modification of existing browser optimization templates to better use various functions of different browser types, without requiring the owner of each system of the present invention to program their own browser optimization template. The operator of the central template server could simply program the new browser optimization templates and the servers of the various wireless communication systems that were operatively connected to the central template server could access those templates in the central template repository.

In certain cases, the browser of the wireless device will actually be able to interact with the user of the wireless device by various configurable controls. For example, there might be one or more customizable buttons or the like on the device which can be reconfigured by software within the device to carry out various functions. Another type of an action which could be carried out by the application of a browser optimization template in a requested content data set could be to include in the data set the necessary software components to reconfigure or customize those customizable buttons, where it was programmed into the browser optimization template that those buttons were available to that

particular type of browser and could be customized in certain fashions. It will be understood that any such device reconfiguration is also contemplated within the scope of the activity which might be undertaken by a browser optimization template in accordance with the present invention.

One embodiment of the system of the present invention including a central template server might see the server of the system operatively connected to the central template server such that the central template repository which contained all of the most up-to-date browser optimization templates would actually be accessed by the server each time that a browser optimization template was required. This would ensure that each time a template was used, only the most up-to-date browser optimization template, as available in the central template repository, would be used. The network overhead of this configuration, however, would be higher than others and as such it would not be the highest speed communications available between the server of the system and the central template server. It may not be the quickest method of accessing the most up-to-date browser optimization templates to proceed in this fashion.

Another alternative to having the server of the system access the central template repository each time that a browser optimizing template was required would be to duplicate or replicate the browser optimization templates from the central templates repository on the central template server to memory of the server from time to time. Periodic updates could be scheduled on whatever basis or frequency were required and yet the speed of the server would not be adversely affected in individual transactions or applying browser optimization templates to requested data subsets.

It will be understood that various hardware and software combinations could be conceived by one skilled in the art which would accomplish this objective of providing a central template repository on a computer other than the server of the system from which the browser optimization templates of the server of one or more systems of the present invention could be copied, accessed or replicated in order to provide centralized access to the most up-to-date set of browser optimization templates available. It will be understood that all such configurations are contemplated within the scope of the present invention.

Template generator:

The system might optionally also include a template generator which, in conjunction with the content optimization system, could automatically or semi-automatically with user intervention, design new browser optimization templates for new browsers accessing the system for which there is not currently a browser optimization template programmed or stored therein. It will be understood that the precise method of accomplishing the automated generation of new browser optimization templates might be done with customized software components, or software authoring tools otherwise available. In any event it will be understood that any software component or software and hardware combination which yields the creation of new browser optimization templates for otherwise unknown browsers is contemplated within the scope of the present invention.

Conclusion:

While the invention has been described herein with reference to certain preferred embodiments, these embodiments have been presented by way of example only

and not to limit the scope of the invention. Accordingly, the scope of the invention should be defined only in accordance with the claims that follow. In the following claims, reference characters used to designate claim steps are provided for convenience of description only and are not intended to imply any particular order for performing the steps.

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